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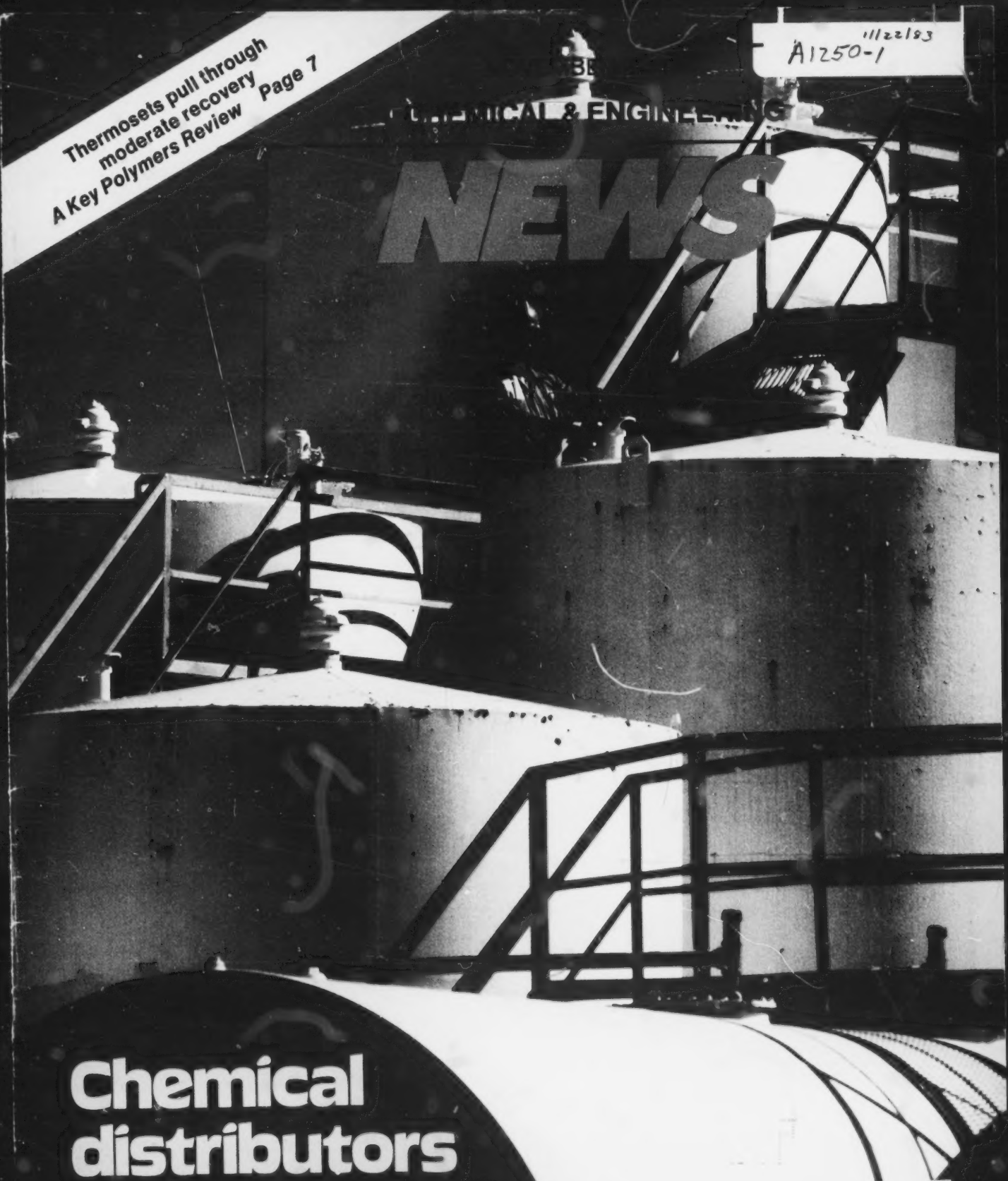
CHEMICAL & ENGINEERING

NEWS

Thermosets pull through moderate recovery
A Key Polymers Review Page 7



Chemical distributors

head into rapid growth

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Cover: Bulk storage of liquid chemicals at Ashland Chemical's industrial chemicals and solvents division, Indianapolis

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News of the Week

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Business

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Technology Policy

NAE president Robert White says the academy is uniquely qualified to deal with problems of technology and society. **Page 17**

Technology

Argonne chemists make artificial coal in attempts to determine coal's structure and how it was formed in nature. **Page 42**

New gas-treating agent developed by Exxon R&E removes hydrogen sulfide from gases, increases scrubbing capacity 40%. **Page 43**

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Congressional fellows Norine Noonan and Randall Wedin enjoyed their year working as aides on Capitol Hill. **Page 44**

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Distribution Report

Chemical distributors gain acceptance by producers, now account for about 10% of chemical sales. **Page 21**

BIOTECHNOLOGY STOCKS: Still popular, but some are struggling

Three years after Genentech issued the first biotechnology stock to a tremendous welcome on Wall Street, biotechnology stocks are more popular than ever. Biotechnology companies, still mostly small firms, are issuing initial stock offerings with increasing frequency to a somewhat moderated, but still warm, response. This continues even though, for the most part, they are companies without either products or earnings. Most of the company stock involved still trades on little more than exotic promise and the number of Ph.D.s on the employee roster. After three years, the biotechnology sector is still being called an "investment fairyland."

The overall dip in the stock market in the past several months probably has affected biotechnology issues more severely than most, but performance is still good overall. Stock prices of 16 companies that went public more than a year ago rose an unweighted average of about 4% during the past 12 months. The Over-the-Counter composite index, by comparison, grew 19% during the same period. Almost all biotechnology shares are traded over the counter.

Of the 16 firms' stock prices, half went up in the past year and half went down. The big gainers were Life Sciences, up 329%; Bio-Response, up 69%; Genex, up 55%; Biotech Research, up 36%; and Genetic Systems, up 17%. The cost of the recent market downturn shows, however: Genex, at 14 3/8 now, was selling for 19 1/4 in early August; Biotech Research, now at 4 3/4, has plummeted from an August price of 15 1/2; and Genetic Systems, now at 9 1/4, sold for 14 in August.

Of the 16, the biggest losers were Monoclonal Antibodies, down 38%; Collaborative Research, down 37%; and Centocor, down 33%. As with the other companies, much of the decline has come in the past few months.

The least fortunate biotechnology stocks, however, have been the new issues. Five companies that have gone public this year—AmGen, Biogen, Bio-Technology General, Damon, and Integrated Genetics—have all seen the price of their stock decline sharply since the initial offering. AmGen, for example, went public at 18 in June. Since then, its stock has shrunk to 5 7/8, less than a third its original value. Biogen, now at 12, is 48% lower than its initial asking price in March of 23. Bio-Technology General opened at 12 1/2 in September. Now it sells for 8 3/4, 30% less. Damon, which went public in June at 17, now sells for 8 1/4, down 51%. And Integrated Genetics, which began at 13 in July, has declined 54% to 6 in mid-November.

The new companies on the block can take some comfort, perhaps, in that they probably are following a pattern. Most biotechnology stocks have had a history of losing value after an initial outburst of enthusiasm from Wall Street. With passing time and evidence that the companies are moving steadily toward development of some of their inventions, however, they have been rewarded by revitalization. Most of the older biotechnology stocks, in fact, now sell a good bit higher than their initial offering price.

Genentech stock, for instance, despite a 24% decline over the past 12 months, is still well above its October 1980 offering of 23 3/8. Monoclonal Antibodies stock, which has plummeted this year, remains well above its initial price in August 1981 of 10. And Hybritech stock is worth more than twice its initial offering price of 11 in October 1981. Perhaps the biggest success story in this regard is Enzo Biochem. The genetic engineering firm's stock went public at 1 in June 1980; recently it was selling for 22 3/4.

Some stocks continue to struggle to match their initial promise, on the other hand. Collaborative Research shares sold for 11 when the company went public in February 1982. Now they cost 9 1/8. Cetus stock, regarded by Wall Street before its initial offering with the same fervor accorded Genentech, now sells for 12 1/2, far below its March 1981 asking price at opening of 23. □

Mixed results for biotechnology stocks so far in 1983

Company[a]	Price 11/ 11/83	Price 11/ 12/82[b]	% change[c]
AmGen	5⅞	18	−67%[d]
Biogen	12	23	−48[e]
Bio-Response	11⅝	6⅞	69
Biotech Research Labs	4¾	3½	36
Bio-Technology General	8¾	12½	−30[f]
Centocor	16¼	24⅛	−33
Cetus	12½	12¾	−2
Collaborative Research	9⅛	14½	−37
Damon	8¼	17	−51[d]
Enzo Biochem	22	19½	17
Genentech	30¾	40½	−24
Genetic Engineering	5⅛	3⅞	32
Genetic Systems	9¼	7⅞	17
Genex	14⅜	9¼	56
HybriTech	20¾	27¾	−25
Integrated Genetics	6	13	−54[g]
Interferon Sciences	4½	4⅝	−3
Life Sciences	15	3½	329
Molecular Genetics	13¾	15¼	−10
Monoclonal Antibodies	14	22½	−38
Novo Industri	64⅝	43	50
Over-the-Counter Composite Index	277.3	232.61	19%

a All traded Over-the-Counter except Novo (New York Stock Exchange). b Or at initial offering if later. c Since 11/12/82 or initial offering if later. d First offering June 1983. e First offering March 1983. f First offering September 1983. g First offering July 1983.

Thermoset Plastics Ride Durable Goods Recovery

Though not yet in sight of new production records or high capacity use, phenolics, polyesters, and epoxies manage moderate rebounds

Bruce F. Greek, C&EN Houston

As expected from the recovery this year in housing, automobiles, and other expensive consumer durables making up their dominant market, recovery also is well under way for major thermoset plastics. The top three covered in the following pages—phenolics, polyesters, and epoxies—are all taking part in the upswing.

But thermosets as usual don't have the go-power of thermoplastics (C&EN, April 18, page 11) even in this recovery year. Thermoset resin sales remain below previous highs of the late 1970s, and for some, volume may not reach new highs for a long time. As a result, some plant capacity has been closed permanently, and other capacity is shut down.

Even with a generous capacity deduction for shutdown plants, capacity is still high relative to expected sales for the next few years. The consequent low operating rates suggest strongly that downward pressure will weigh on prices, that profit margins won't match those of the past or what producers expect, and that returns on investment will be low. Hence, most industry analysts agree that new capital investment in these resins will be minimal.

Key Polymers

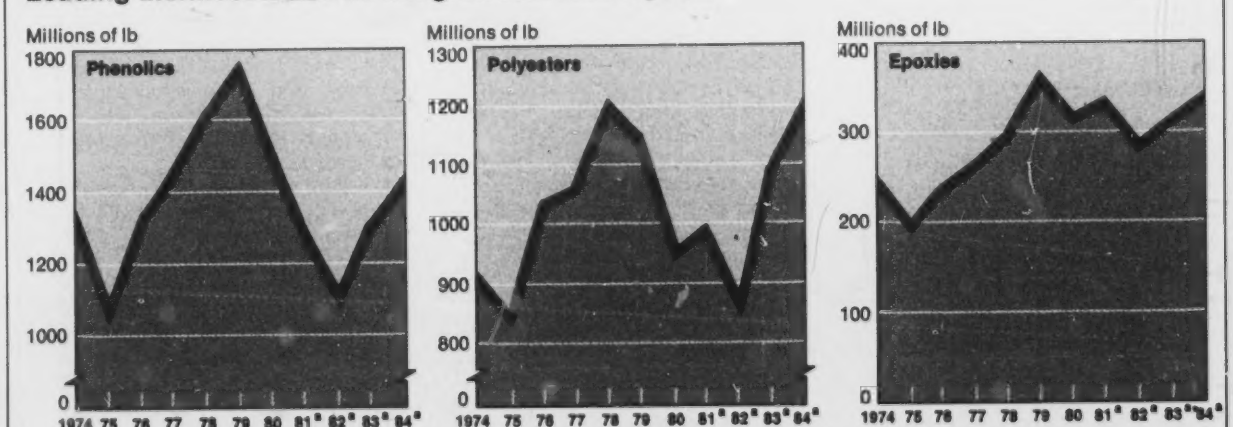
With the lone exception of unsaturated polyester, full recovery of these resins likely will take longer than 1984. That might be too long if another economic downturn takes hold in 1985 or 1986 as many economic forecasters are predicting.

The longer-term outlook then for these resins is not especially bright. They are considered moderately to almost completely mature products, so growth will be largely connected to constant-dollar gross national product, unless producers' new-use development begins to pay off.

Examples of such potential development are many. Transportation uses could boom anew under pressure of economic downturns and higher gasoline and structural materials costs. Such new growth in transportation has been expected for a long time although stymied time and again because of technical problems. One important block is that there seems to be no real solution to date on getting high production rates for many thermoset parts without capital investment much higher than for competing metal parts.

If these problems are ever solved, analysts are wide-eyed about the potential. Resulting inroads, they say, in transportation or housing could easily soak up all available thermoset capacity. But for now, such swift market capture doesn't seem to be in the cards.

Leading thermosets had no net growth in recent years

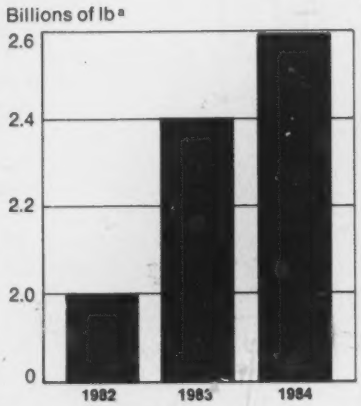


a Resin content only, to remain consistent with data for earlier years. **Sources:** Committee on resins statistics of Society of the Plastics Industry, C&EN estimates

Phenolics

- ***Demand improving***
- ***Capacity shrinking***
- ***Prices up a bit***

PRODUCTION



[a] Gross weight including solvents.

HOW MADE

Condensation of phenol and formaldehyde; subsequently cured by heat alone or with a crosslinking agent

MAJOR END USES

Plywood adhesives 50%, insulation adhesives 15%, molded items 10%, fiber and particle board adhesives 10%

FOREIGN TRADE

Exports—may reach 20 million lb in 1983, imports—negligible

PRICES

Bulk grades start about 20 cents per lb

COMMERCIAL VALUE

$600 million for production, 1983

Phenolics are tough, inexpensive resins well suited to mass use in construction, their dominant market. But heavy dependence on this gyrating outlet has put phenolics on a roller coaster in recent years. Right now, these thermosets are riding sharply up and have another year of strong growth in store in 1984. However, this recovery is put sadly in perspective by phenolics' dizzy 40% plunge in production from 1979 to the recessionary depths of 1982. It has been a wild several years.

In fact, recessions have been so severe on phenolics in the past decade that the materials have practically no net growth despite some strong gains in recovery periods like the present. Producers have tried to buffer themselves from the wrenching swings in conventional uses by developing new, higher-property grades but without much success. For example, General Electric tried this with its molding phenolics in the 1970s but left the business completely at the end of 1982, after producing these resins for more than 50 years.

For 1983 phenolics production is moving up about 20% from 1982, say analysts of this hard-to-measure product. Including various fillers, additives, and solvents in the compounded resins, production will reach about 2.4 billion lb. This level will top 1981 by about 2%. Another 8 to 10% production gain is possible in 1984 for a total of about 2.6 billion lb on the same gross weight basis.

Industry sources estimate resin weight alone at 1.32 billion lb in 1983 and 1.43 billion lb in 1984. In 1981, the committee on resin statistics of the Society of the Plastics Industry changed its reporting method to a gross weight basis from actual resin content. Hence, current data comparable to historical series must be unofficial estimates from industry analysts.

Figured either way, production of these resins still has a long way to go before regaining the old highs. Production back in 1979 exceeded 3.2 billion lb on a gross weight basis or 1.7 billion lb on a net resin basis. If after 1984 phenolics production falls into the typical growth pattern of 1 to 3% annually for mature products, a new production record will take a long time.

Adding to the problem are some constricting fundamental shifts in the phenolics business. One is a slow substitution among resins in various end uses, a trend generally hurting the more mature materials such as phenolics. Another, closely related, is a decline in recent years in phenolics producers and plant capacity. A third shift, also related, is declining consumer demand for some products using phenolics either for parts or processing.

Capacity for phenolics is and has been an elusive statistic. Among the many complicating factors is the multitude of producers, some of whom operate their equipment on irregular schedules or in tandem operations with other resins. Because the technology is relatively simple and capital investment low, small producers enter and leave the business frequently. Captive capacity and production also vary with economic ups and downs.

The driving force behind all this switching in producers, capacity, and production is the construction market, where at least 75% of phenolics wind up. By far the largest share goes into adhesives for plywood. Important secondary shares go into various kinds of fiber and particle board, insulation adhesives, and many smaller products used in homes and commercial buildings.

The vigorous recovery in home building in 1983 and anticipation of a continued brisk pace in 1984 account for much of the increased demand forecast for phenolic resins. One help has been added penetration of board wood in structural use as builders strive to reduce costs.

The many other uses of phenolics are small. Some, such as foundry core binders, also have recovered well, but they cannot affect the total demand significantly.

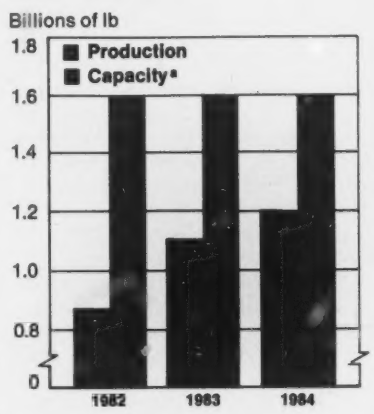
On balance, phenolics will swing along with construction as always. This means that another good recovery period in 1984 will depend crucially on the state of interest rates in construction financing. So far, so good, is the current outlook. But overdone credit demand could always change that in a year or so. Hence, forecasts for this resin show a caution light after 1984.

Key Polymers

Polyesters

- ***Demand well up***
- ***Capacity on hold***
- ***Prices steady***

PRODUCTION/CAPACITY



a First quarter.

HOW MADE

Mainly polyesterification of maleic and phthalic anhydrides with propylene glycol

MAJOR END USES

Commercial, home, and industrial construction materials 30%, boats and marine products 20%, transportation equipment 10%, consumer products 10%

FOREIGN TRADE

Exports—may reach 10 million lb in 1983, imports—negligible

PRICES

List prices 50 to 60 cents per lb

COMMERCIAL VALUE

$600 million for production, 1983

A long-time center of growth efforts and new-use development in thermosets, unsaturated polyesters are rewarding their backers with the strongest recovery of the year among these resins. After stumbling 28% from the old production high point of 1.21 billion lb in 1978 to 865 million lb in 1982, polyesters are roaring back 27% in just one year to 1.10 billion lb in 1983. Next year another gain of 8 to 10% could bring production back to 1.2 billion lb.

Even if production soars to new records in 1984 and 1985, it won't strain capacity in the least. Although polyester capacity data have some of the same uncertainty as do phenolics statistics, analysts agree that capacity has been in large excess for several years and will stay that way. Capacity has been considered fairly flat, with estimates in recent years ranging up to 2.1 billion lb per year. That's too high, many analysts say. A more likely figure is 1.8 billion lb, and conservatives list 1.6 billion lb, taking out both reactor equipment that can be used for making other resins and plants that have been shut down for some time.

New capacity will not be added, analysts say, citing tough lessons for producers beginning in 1979, when important markets crumbled in boats and construction. Until consumers begin to feel freer with discretionary income, big-ticket luxury items such as boats will drag down polyester growth. Boats are especially important to polyester because of their relatively high resin content, on average 65% compared to 35% in some construction laminates.

Fortunately, polyesters have a wide array of alternate markets and are not lashed so tightly to construction as are phenolics. Between 75 and 80% of polyester resins go into fabricated products reinforced with glass fiber or, in a few instances, with other materials. Much of the nonreinforced polyester products go into the same end markets as do the reinforced products. For example, items cast from polyesters without reinforcement often go into decorative consumer products and so are included in that category along with the reinforced items.

Construction is the largest end use of polyesters with about one third of consumption. In this market, polyesters share with phenolics an uneasy dependence on business cycle ups and downs and, in turn, on interest rates. Although polyesters go more into interior uses such as bathroom fixtures and less into structural board, they received the same boost as did phenolics from the big decline in interest rates in the past year. For 1984, it's the divergence in interest rate forecasts that underlies the major differences in polyester forecasts in this market. Polyesters would be sensitive to any rate increases, which some forecasters hold as a possibility beginning in the second half of the year.

Boats and marine accessories rank next in use of unsaturated polyesters. The most recent peak for this application was in the late 1970s. The intervening recession years badly hurt this market and similar recreational products in transportation. Further recovery now appears modest, subject mainly to additional developmental work that could bring more market capture from metals and wood.

Most other uses of these resins are relatively small. Automotive uses are a big priority but even after more than 10 years of pushing polyesters as a major way to save weight and improve durability, producers admit that much potential has yet to be realized. Further developmental work improving consumers' and auto makers' acceptance of coatings on finished items may help demand, but most people in the industry doubt that this will happen in the next five years.

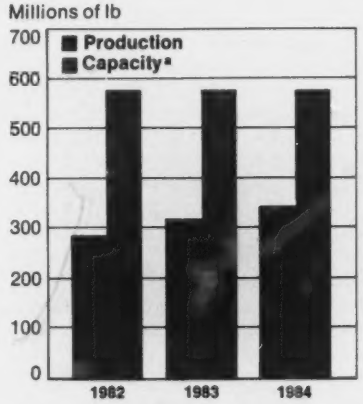
Such developmental work in polyesters is large relative to other thermoset plastics. It suggests potential for more capture of markets now held by other materials. Likely targets for future gains include tanks, wall systems, and corrosion-resistant products in which polyesters are already well established.

A major hindrance in this development work will be low profitability. Although growing nicely this year and next, polyester suffers low returns on investment, largely because of its excess capacity. Prices are no higher than a year ago, and polyester's value increase this year all will be due to higher volume.

Epoxies

- ***Demand pushing up***
- ***Capacity to rise***
- ***Prices on hold***

PRODUCTION/CAPACITY



a First quarter, includes liquid and solid unmodified resin.

HOW MADE

Mainly reaction of bisphenol A with epichlorohydrin followed by subsequent crosslinking with hardeners

MAJOR END USES

Coatings 45%, laminates and composites 25%, castings and molded items 10%, flooring 5%, adhesives 5%

FOREIGN TRADE

Exports—declining to about 35 million lb in 1983, imports—negligible

PRICES

Most list prices $1.25 to $1.45 per lb

COMMERCIAL VALUE

$425 million for sales, 1983

On the premium-quality, high-priced end of the thermoset spectrum, epoxies have figured for a decade to benefit from quality-improvement campaigns in auto, electronics, and other durables markets. In practice, however, gains have been intermittent, yielding all too readily to recessions. From peak to trough in the rough business climate of the past four years, epoxy production dropped 21%. That was the lowest decline among major thermosets but was still a blow for a strongly development-oriented resin.

For 1983, analysts put epoxy output between 310 million and 320 million lb, up 8 to 12% from 1982 production of 286 million lb. A similar gain is expected in 1984, bringing the total to about 340 million lb. This still will be 6% below the record 361 million lb in 1979.

Plant capacity for unmodified epoxy resins, including liquid and solid types, has held steady since 1981 at about 580 million lb per year. But that is about to change. In mid-1984, Ciba-Geigy will complete a new plant at McIntosh, Ala., with a capacity of 100 million lb a year. Offsetting much of this addition, Ciba will then shut down capacity of 40 million to 60 million lb a year at Toms River, N.J., so the net gain will be relatively small, and additional production in 1984 will be quite small.

If 1984 production reaches 340 million lb, and available capacity totals 600 million lb, then the operating rate will not reach 60% of nameplate capacity. This level of operation doesn't suggest a highly profitable business, even though these resins command a high unit price and effective top capacity is considerably below nameplate because of complications in switching production of different grades. Capacity use looks especially bad in view of epoxies' slow expansion in their multitude of high-performance uses.

For example, coatings account for the largest share, about 45%, of epoxy resin demand. And a big use area of epoxy coatings is in automotive primers. Since auto production has swung up again, epoxy demand in this use also has begun to move up. Although recovery hasn't reached levels before the recession, autos are getting more and more epoxy coatings as demand for corrosion resistance increases. So epoxy has market penetration working in its favor.

The largest coatings use of epoxy resins is containers, particularly cans for beer, soft drinks, and some foods, all of which are considered mildly corrosive materials. Epoxy resins fit performance needs in these uses although at higher costs than for other resins, some of which apparently cause taste problems. Prospects for epoxies in container coatings are low inasmuch as most of the basic market penetration is over. Future gains will be just a small fraction above overall growth in can use. Long-range, a cloud on the container horizon is competition from plastic bottles, which could hurt this market later in the 1980s.

Other major coatings markets for epoxies are what might be expected of a high-performance material—marine, appliance, coil steel, pipe, and electrical products. Since epoxies already dominate some of these markets, growth there likely will be tied to the overall economy. Competition also exists in some areas, requiring developmental work by epoxy producers to keep ahead of other materials.

Reinforced epoxy resins used in a wide variety of laminates and composites account for the second largest epoxy use. Some of these applications are in aerospace, where performance is critical, resins very special, and prices lofty. No single use in this large group of end products now appears to be moving with enough steam to have much impact on total epoxy demand.

The many other uses of epoxy resins combine to account for about a third of the total. Some of these, such as electronic chips, also require extremely high performance. Their volume is tiny and selling prices very high, but they don't do anything for overall epoxy profitability.

Hence, epoxies face a strangely frustrating time of it financially despite their heavy participation in high-tech markets that promise, but so far have not provided, breakaway growth. Producers have capacity to spare for any such takeoff, but as of now, moderate growth is the outlook.

Chemical Distributors' Improving Status

Typically handled by distributors are bag-lots of chemicals such as this soda ash

David Webber, C&EN New York

If this were an ideal world, says one chemical distributor, chemical producers would see their distributors as so many natural and logical arms of their business. In reality, he concedes, many producers have long been more apt to see them as so many extra hands in the cookie jar. Too many manufacturers traditionally have resented distributors as low-investment, high-profit operators "not much different from used car dealers," he says. "We're fighting to change that image."

To a great extent, it is a battle that chemical distributors already have won. Chemical producers by and large now discuss their relationships with distributors in terms of "partnerships." They have created high-level executive posts dedicated to distributor sales. They have moved to formalize the producer-distributor relationship with policies that present a unified, corporate attitude. In some cases, producers are even referring customers whom they cannot or do not want to service to their distributor.

Distributors occupy a special place in the chemical industry. Unlike producers, which tend to be clustered in Texas, New Jersey, and a few other states, distributors are widely dispersed geographically. They are much closer in total to the downstream market, customers who use chemicals either in further man-

ufacturing or as final products. Most producers admit that this proximity and concentration on limited areas—as well as their sheer numbers (more than 6000 of them)—make it possible for distributors to service customers who buy in less-than-truckload quantities much better than producers usually can. In return, however, distributors buy less-than-truckload shipments from producers at a discount and sometimes compete with producers in the same end-use market—two factors that can lead to friction.

Many chemical companies, of course, have had a carefully groomed relationship with distributors for a long time. But there has been a surge in both the quantity and quality of attention paid to distributor sales in recent years. Producers may not yet have learned to like their distributors for taking a cut of the sales dollar, but they have learned to respect them.

The reason is sales. The share of chemical shipments now accounted for by distributors is higher than it has ever been. Last year, according to Bureau of the Census data, distributor sales of chemicals and allied products totaled $17.4 billion, 10.3% of all sales in the sector. Impressive as that share seems, it understates the importance of distributor sales in the part of the chemicals and allied products spectrum in which distributors actually do business. Distributors carry only some of that sector's materials in their product lines; of total 1982 chemicals and allied products sales of about $169 billion, $82 billion worth, or 48.6%, was composed of products that distributors almost never handled. So in the $86.8 billion marketplace in which chemical distributors did do business last year, their presence was weightier, accounting for one out of every five dollars in sales.

In 1977, by comparison, distributor sales totaled $9.7 billion, or 8.1% of overall sales of chemicals and allied products, and in 1972, they amounted to $4.6 billion, or 8.6% of such sales, according to compilations of Census Bureau data performed by C. H. Kline & Co, a Fairfield, N.J., market research house.

As a result, distributors figure more prominently in the eyes of chemical management than ever before. At many companies that until recently left decisions on distributor use to the individual product or branch manager there is now an executive delegated exclusively to the task of bringing a single, corporate-level approach to distributor sales programs.

Celanese Chemical, for example, created the post of general sales manager-distributors in October 1982. The new position comes with broad authority. According to the company job description, it is meant to be the focal point for both the selection and termination of distributors and the planning of distributor marketing and sales programs as well as the primary link between chemical company management and the distributor market.

"You have to have this kind of position to be organized in your distributor relationships," points out Thomas L. Rogers, who holds the new post at Celanese. "It has to be a centrally controlled approach. The reason for a single authority on this for us is the development of policy that gives a clear understanding across all distributor lines of what is expected of the distributor and what the distributor should expect of the producer. We haven't had that in the past."

PPG Industries, about 20% of whose industrial chemical sales moves through distributors, also recently formed a corporate-level office to administer distributor business. "The creation of my new job is in recognition of the importance of distributors to PPG," remarks C. Michael Buerkle, who fills that new post. "Distributors are an important sector of our business, and we needed to give them as an individual category more specific attention."

Du Pont, on the other hand, maintains control of distributor programs at the department level. To build a corporate overview, however, the company has established a corporate distributor marketing committee. The committee functions more or less as a forum for the exchange of ideas between the various departments' distribution program managers. Du Pont does not have a corporate executive post dedicated to distributors.

Companies like Celanese and PPG are recent additions to a lineup of blue-chip chemical producers such as Union Carbide, Dow Chemical, Exxon, and Shell, which have well-planned distribution programs. "It's a coordination function," notes Robert Gunn, a principal at A. T. Kearney Inc., a New York City management consulting firm. "Somebody in the organization needs to keep track of what's happening, what the strategy is for each class of distributor, where they're going, and how the organization needs to position itself with distributors. Somebody needs to maintain the relationship with distributors."

It is the task of defining that relationship that historically has been a problem for producers. The widening of the distributor slice of the chemical market in the past 10 years not only has fostered new management positions, it has forced chemical producers to reassess their view of the distributor's role in the business of selling chemicals: Are distributors nothing more than companies that take care of a small cus-

A distribution dictionary

Chemical distributor. A firm whose primary function is the stocking and selling of chemicals produced either totally or mainly by others. (The definition excludes brokers and importers, who generally do not stock products.)

National distributor. Large, multilocation firm with 30 branches or more.

Independent distributor. Medium-sized and small firms. Such distributors may have several branches, but are limited to a regional or local area.

Distributor discount. Typically a 5 to 10% discount given distributors by producers to provide for both costs and profit margin on less-than-truckload business for which no value is added. Some distributors prefer to call the price break a functional allowance.

Freight allowance. For products sold on a delivered basis, the price reduction granted by producers to distributors who pick up product at the producer's plant or terminal.

tomer, "afterthought" business, or are they now, by virtue of their extremely wide customer base, intrinsic to the marketing of chemicals?

"We look at the relationship with distributors as a partnership," says PPG's Buerkle. "We don't look at distributors as just being a method of moving excess volume when consumer markets are down."

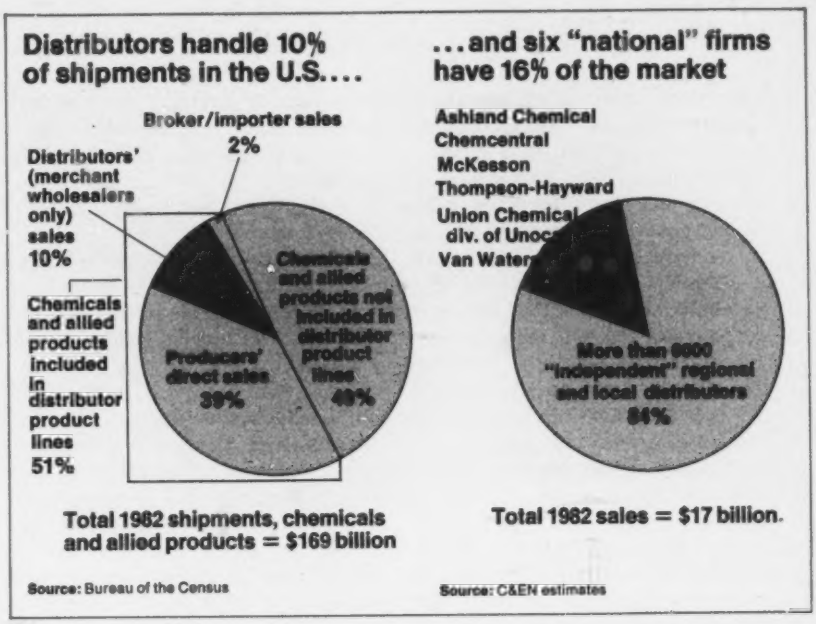
"Yes, it is a partnership," comments Gunn at A. T. Kearney, "but there are hawks and there are doves out there."

Producers consider three basic elements, he says, when they think of their relationship with distributors: Distributors are customers; they are an extension of the producer's marketing and sales force; and they often represent a business relationship that has been built up over time, amounting in many cases to a mutuality of interest.

"The doves recognize the value in each one of those elements, that you need to integrate them," he says. "The hawks say distributors are just customers. In fact, they say, 'We compete with them out there for some end-use business. We're going to take an aggressive posture with distributors. We don't trust them when they come back and ask for support because they're in a competitive situation.' I think there's substantial variation among producers."

Distributors tend to complain that producers overlook much of the benefit they derive from dealing with distributors. "They forget about the services a distributor can give: risk bearing, financing, basic technical service, handling more small customers than a manufacturer can," says James R. Kendell, executive vice president at Great Lakes Terminal & Transport Corp., a medium-sized chemical distribution firm based in Chicago.

The National Association of Chemical Distributors, a trade group with membership consisting of several hundred regional and local distributors—also referred to as "independents" to differentiate them from the large, multilocation "national" distribution companies—concurs. From its headquarters in Dayton, Ohio, the association issues a steady stream of newsletters and brochures touting the indispensability of distributors to the chemical industry.


Distributors handle 10% of shipments in the U.S....
Broker/importer sales 2%
Distributors' (merchant wholesalers only) sales 10%
Chemicals and allied products included in distributor product lines 51%
Chemicals and allied products not included in distributor product lines 49%
Producers' direct sales 39%
Total 1982 shipments, chemicals and allied products = $169 billion
Source: Bureau of the Census
...and six "national" firms have 16% of the market
Ashland Chemical
Chemcentral
McKesson
Thompson-Hayward
Union Chemical div. of Unoc
Van Water
More than 6000 "independent" regional and local distributors 84%
Total 1982 sales = $17 billion.
Source: C&EN estimates

A typical message shows a sprightly bird perched on the back of a dour-looking rhinoceros. In the natural world, the bird keeps insects off the rhino's back, something the lumbering beast, for all its size, can't do alone. With a deft bit of metaphor-stretching, the message compares the bird's activities to the services of the chemical distributor: It can take care of small accounts much better than the chemical producer, the rhinoceros, can itself. "The mutualistic symbiotic relationship," NACD somewhat redundantly labels the picture. "That's the way it should be in the chemical business," the message goes on.

NACD says there are several ways in which distributors enhance the marketing efforts of chemical producers. For example, distributors call on hundreds or thousands of customers each (an average 1600 for each NACD member), and they cultivate their customers closely. They also stock product close to demand, deliver quickly, and extend buying credit to their customers. In addition, NACD says, distributors provide technical know-how, bear the risks of inventory management, and provide extensive information about the marketp. ce.

"We have local stocks, quicker deliveries, and our salesmen call on accounts more often than the producer's salesmen do," says Robert V. Mann, vice president and general manager of the industrial chemical division of Thompson-Hayward Chemical Co. (a subsidiary of Harrisons & Crosfield Group). Thompson-Hayward, headquartered in Kansas City, Kan., is a multilocation, or national, chemical distributor and producer, with combined annual sales ranging between $200 million and $300 million. "There is less turnover in our sales force," he adds, "so we are able to develop a long-term relationship with our customers. We know the account backwards and forwards. And we can offer a package program: one-stop shopping and multiple products on one invoice."

But defining the new producer-distributor relationship entails more than listing what each can do for the other. Producers have reacted to the numbers—the growing share of distributor sales—by recognizing that they represent too big a portion of the marketplace to manage as a sideshow. What they would really like to know is to what extent the increased prominence of distributors is a long-term phenomenon and to what extent it is a recession-born ephemerality that will vanish with economic recovery.

Several developments during the

Producers are formalizing their relationships with distributors

Increasingly, chemical producers have been codifying the intentions and expectations they bring to a business relationship with distributors in the form of policy statements. Generally, a distributor policy statement lists the reasons a producer sells selected chemicals through distributors: typically, to penetrate markets the producer could not otherwise reach; to maximize less-than-truckload sales; and to provide dependable local sources of the producer's products. Most distributor policies also set out what the distributor can expect from the producer and what the producer expects from the distributor.

Following are excerpts from the distributor policies of two chemical producers—Celanese Chemical and PPG Industries—which have fairly recently centralized their management of distributor sales.

Celanese Chemical—To support its distributors, Celanese will:

- Formalize the Celanese/distributor relationship with a distributor agreement that defines policy provisions and Celanese's standard distributor terms and conditions of sale.
- Provide quality products on a consistent basis.
- Promote drum and small-volume bulk sales by referring such business to distributors.
- Provide technical and safety data support.
- Provide market information on a timely basis.
- Provide efficient, conveniently located terminals.
- Provide realistic pricing policies and responses that are consistent with market conditions.

PPG Industries—PPG's policy describes its commitment to distributors in similar terms, adding that it will:

- Provide marketing support through joint calls, sales and technical literature, advertising, and product and marketing training programs that help the distributor to be an effective representative of PPG products.
- Provide a commitment from marketing and regional sales management to assure that the relationship with the distributor will be a working one. PPG recommends periodic reviews of both parties' performance in the relationship.
- Provide frequent contact by PPG's sales representatives to share information on market conditions and trends, supply capabilities, new products and packages, and governmental regulations and legislation that affect PPG products.

PPG's distributor assumes these responsibilities:

- Provide customer service through a broad product line, short lead time delivery capabilities, and product quantities suited to the market.
- Share intelligence with PPG on markets, product uses, and competitive trends in the industries served.
- Maintain a responsible company image and sales position in the marketplace through a trained knowledgeable sales force, and use PPG product and national market knowledge to ensure a strong and informed sales force.
- Comply with product safety recommendations that are provided by PPG, and follow good in-plant practices.
- Maintain good, sound financial management to ensure his or her, and consequently PPG's, long-term growth position in the marketplace.
- Communicate future plans in business expansion or shift in business focus to ensure PPG adequate and continued product representation.
- Commit to the distributor-PPG partnership concept through the same open line of communication to which PPG is committed.

Celanese's requirements of its distributors are essentially similar.

recession had a major impact on the chemical distribution industry. Most significantly, high interest rates and cash flow squeeze forced most, if not all, chemical consumers to reconsider their inventory management policy. Leaner inventories at the end-use level put a lot of strain on producers. For distributors, the impact showed among the marginal consumers, the small- to medium-sized companies that traditionally had purchased their chemicals in bulk, but at widely spaced intervals. As recession forces squeezed them, the marginal consumers shifted in droves to more frequent purchases of smaller quantities. For most, this meant leaving the bulk marketplace, dominated by producers, and entering the less-than-truckload arena, dominated by distributors.

"When people saw the recession coming, they started going after their receivables and inventories," comments Great Lakes Terminal & Transport's Kendell. "People didn't want those five or six drums sitting around for months, so they started buying more frequently in smaller amounts. All this benefited us significantly."

At the same time, chemical producers were taking other steps to lower their sales costs. Sales forces were consolidated and, in many cases, trimmed. As a consequence, most producers and distributors say, the ability of producers' sales forces to call on, follow up calls, and otherwise develop small accounts fell victim to economics. But even if a producer no longer could handle a customer itself, it might not want to sacrifice the business entirely. So, like many consumers, producers turned to distributors. For the cost of the distributor discount—typically 5 to 10% of the product price—a producer could retain its presence in, and most of its revenues from, a portion of the market that was growing.

"What we've had in recent years is a reduction in producer sales forces," notes Thompson-Hayward's Mann. "Rather than covering three states, a producer's salesmen might be covering six or seven states now. They just cannot be in front of those customers often enough to keep the business from their competitors."

Although these factors undoubtedly contributed to the growth of the distributor share of chemicals and allied products shipments from 8.1% in 1977 to 10.3% in 1982, they cannot be seen as purely recession-related developments. To a great

extent, changes in both inventory management strategies and in producer involvement in the less-than-truckload market are part of a long-term trend. Many participants—both producers and distributors—believe that what the recession did was to accelerate, rather than engender, these changes.

PPG, for instance, notes distributor sales manager Buerkle, has been out of small-quantity industrial chemical sales for years. "It's the cost of doing business," he explains. "We can't afford to be in the [less-than-truckload] business." He estimates that there are probably some 70,000 end-use customers for chlorinated solvents, an important product line at PPG. "There's no way in the world we can afford to go out and service all those accounts."

As a result, more than 85% of PPG's chlorinated solvent sales are handled by distributors.

Starting with such basic logistics, many say, the list of reasons for the general move away from small-quantity business on the part of producers grows. "Many producers have discovered on their own or through the actions of other suppliers that they can rely on resale people such as us to actually give them a greater net back than they themselves can achieve," says Richard T. Hough, chief executive officer of Chemcentral Inc., a $400 million per-year multilocation distributor based in Chicago. "We handle a lot more products than they do, can put together a bigger package than they can—a package more suitable to the customer—and also have a pretty expansive sales force. They employ us for that."

Besides pruning their sales forces, A. T. Kearney's Gunn points out, chemical producers also have rationalized their product lines. This means that producers are more often unable to deliver products to customers as effectively as distributors can, because they do not have as many complementary product lines, he says.

Another long-term trend that has turned business toward distributors, Gunn says, is computerization. With the widespread adoption of computers, the duties of purchasing managers have broadened. "It's not uncommon for them to be buying a thousand items," Gunn explains. "They're too busy to have a million sources for their product lines, so they end up going to a distributor who can serve them well across a broad product family for products they can't order in straight load quantities on a frequent basis. So the distributor is filling a real need that's marketplace-driven."

Rogers: centrally controlled approach

Buerkle: distributors are key sector

Gunn: a coordination function

Of prime interest to both producers and distributors, however, is the future of the current trend toward leaner inventories. In the short run, many agree, inventories will remain lower than is normal at this point in a recovery, a factor that will keep business that is entirely related to the recession in the hands of distributors.

"My feeling is that a lot of people have looked carefully at their inventory and cost control and are going to be much more active in managing that effectively, at least for the next year or so," remarks Great Lakes' Kendell.

So far, at least, surveys of inventory positions around U.S. industry support that assessment. "With the strong performance of the economy so far this year, it is surprising that inventories have not risen as broadly," comments Charles T. Haffey, vice president for the corporate purchasing division at Pfizer, in the National Association of Purchasing Management's report on the economy in October. "This may indicate a fundamental change in business strategy regarding inventory policy. Purchasing managers seem determined to operate with lower inventories, even in the face of continued demand for goods."

Consequently, fewer purchasing managers reported that their stocks had increased in October than did so in September or August, NAPM reports. And 21% of those surveyed replied that they actually had lowered their inventory levels in October.

Many believe that the new attitudes toward inventory management manifesting themselves now in reports like NAPM's will continue to form inventory management policy in the future. "The inventory trend will continue," says Celanese's Rogers. "The reason is a combination of the financial advan-

tage and having companies now that, being computerized, can handle smaller inventories over the long run. I don't think we'll ever go back to the days of huge inventory stocks unless a shortage comes along. On a general day-to-day basis, I see inventory maintenance in the future at some percentage below what it's been in past good times."

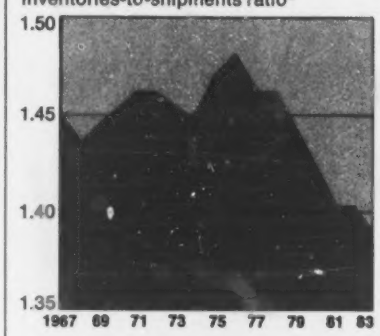
PPG's Buerkle agrees. "I personally believe that we're going to see more inventory reductions, especially now," he says. "I never did understand why people bought something three or four times a year [in bulk] instead of using the services of a distributor and improving their cash flow."

Not everyone is sure that the lean inventory trend will last, however. "It's a question yet to be answered," remarks Chemcentral's Hough.

To some, the answer is that the change in inventory policy is part fundamental, part cyclical. At Du Pont, for example, Maxwell L. Cluett, distributors manager in the chemicals and pigments department, points out that what some people might consider evidence of a long-term trend could be deceptive.

"It's true, some large and mid-size consumers during the recession shifted from buying truckload quantities from a producer and will on a short term purchase smaller quantities from a distributor," he says. "That has its ups and downs going through a recession, but it's a temporary thing. The [major change in inventory management that] people are talking about is something that exists now as we are just coming out of a couple of back-to-back recessions, so it may seem like it's a prolonged kind of happening. But if you go back historically, back to World War II, that has not been the trend through all that period."

Inventories trend downward since mid-1970s



[a] 10-year running average for seasonally adjusted June data for chemical and allied product companies.
Source: Commerce Department

At any rate, Cluett says, charting the future longevity of lean inventory management in the chemical consumer industries is nothing more than guesswork. "But that's not the important side of the growth of the chemical distribution industry anyway," he argues. "The inventory control aspect of the chemical industry is not the future of the chemical distribution industry."

Cluett's analysis homes in on the question of whether the chemical distributor slice of the pie will continue to grow and, if so, how much. When most analysts describe the distribution market, they talk in terms of a 20% share today, growing to 25%, or even 30% in the most optimistic forecasts, by 1990. Cluett stresses that the 20% share base analysts talk about refers to only that part of the chemicals and allied products market, the 51.4%, in which distributors currently do business.

"So if you say that chemical distributors are going from a 20% share to a 30% share, that says to me that you're just going to sell more of the same products that you're now handling for producers," he says.

This type of analysis ignores the enormous 48.6% of all chemical shipments in which distributors at present play no role, Cluett says. "I don't think that [increased sales of products currently in distributor product lines] is where the growth

Producer pricing for distributors: changes may be coming

There are two major elements in a producer's distributor pricing policy: the distributor discount and freight allowance. The distributor discount, which typically ranges from 5 to 10% depending on the product, is meant to cover a distributor's costs and provide a profit margin. Some distributors prefer the label functional allowance, which they argue clarifies the reason for the price break.

The freight allowance, which affects only products normally sold on a delivered basis, is meant to cover the transportation costs of a distributor who picks up product at the producer's plant or terminal.

Freight allowance was a relatively straightforward matter before deregulation of the trucking industry. Set rates meant a producer knew exactly how much it would cost to transport product from point A to point B. The competitive and soft pricing that succeeded deregulation has made it very difficult for producers to judge what a distributor is really paying for transportation now. For this reason, many producers worry that some distributors are reporting and receiving an allowance for the highest carriage rates on the market while actually paying less.

And, although most hesitate to discuss it, there is the problem of "phantom freight": distributors receiving freight allowance for the cost of transportation from point A to B, but actually delivering the shipment to a third point somewhere between—and pocketing the difference. There is much debate on the prevalence of "phantom freight," but little doubt that it occurs.

One solution, some producers say, would be to make all sales to distributors f.o.b plant. But most think that option too extreme. What is more likely, many say, is a trend toward more negotiation on the size of the freight allowance, and, in some cases, changing the freight terms from freight allowed to freight equalized.

If there are changes on freight allowances, they won't go down easily. "Distributor managers," says an executive at one distribution firm, "get vehement on this subject."

The distributor discount seems less vulnerable. "There are people who think that the distributor's discount is too much," says A. T. Kearney consultant Robert Gunn. "That's not really the case. Distributors operate on very thin margins."

of the chemical distribution industry is," he argues. "I think it will be the new products, those products not now being handled by distributors. If you calculate future growth on that basis, I'll agree to the share going from 10% to 15%."

As an example of products moving from the nondistributor into the distributor sector, he points out that titanium dioxide was not sold through distributors just three years ago. At that time, Du Pont decided it wanted to increase its TiO_2 sales effort directed at the less-than-truckload market. The company recently had consolidated the product lines of several departments and simultaneously reduced its sales force. This made it difficult for the company to service even those small accounts it already held, never mind add new ones. "The only practical, economical, and efficient way to do that was to work through distributors," Cluett explains. "That was the basic motive."

In the chemicals and allied products sector, there are lots of products not now sold through distributors, he says. "Tomorrow or next year, some of them may."

Undoubtedly, it will be a combination of factors—tighter inventory control, reduced producer sales forces, and the reformation of distributor product lines—that will lead to growth for chemical distributors in coming years. Whatever the primary reason may be, distributors do agree that they will do well. "We expect to see our market share grow faster than the chemical industry," remarks R. G. Parsons, vice president and general manager of the industrial chemicals and solvents division at Ashland Chemical Co., a multilocation chemical distributor that is also a producer. For the next five years, Parsons anticipates company sales growth to average 1% more than the rate of the gross national product. In Ashland's 1983 fiscal year (which ended Sept. 30), the chemical company had sales of $1.2 billion, roughly 50 to 60% of which belongs to the distribution segment, Parsons says.

Although there is plenty of agreement that chemical distributors are entering a period of prosperity, there is less on whether all members of the industry will benefit from it equally. The national chemical distributors are in general far larger than even the largest independent competitors, with much more extensive personnel and financial resources.

Mann: long-term relationship

Cluett: growth will be in new products

Parsons: increasing market share

The six biggest nationals are Ashland Chemical, Chemcentral, McKesson, Thompson-Hayward Chemical, Union Chemicals division of Unocal, and Van Waters & Rogers. These six companies' combined distributor sales last year were $2.8 billion, or 16.1% of the overall chemical distribution market. The remainder was shared among some 6000 independents. These smaller distributors realize that the nationals will be trying to parlay all the advantages of size into increased market share in coming years.

Calculating a national's clout in the marketplace, however, is not just a matter of comparing its total earnings or asset base to that of an independent competitor. Though a national operates anywhere from 30 to 70 branch terminals compared to a typical independent's one to five branches, the big companies generally run each branch as an individual profit center.

The need to limit the scope of an individual distribution facility's marketing area and number of customers is obvious when one considers the logistics involved. Perhaps the most important aspect of a distributor's customer service is its ability to deliver orders quickly. It does no good for a customer to shift to a leaner inventory if it cannot count on being able to restock rapidly. At Ashland, for instance, a spokesman explains, if a particular branch's customer base grows too large, the company probably will establish an additional branch.

"The distribution business is very much a local, hands-on, entrepreneurial type business," remarks Ashland's Parsons. "Since we are a big company, it's fundamentally important to us that we maintain that character. So the district manager is the key person. The rest of Ashland is structured to be a support organization."

It is in the support function that the nationals display the advantages of size. Parsons, for instance, notes

that the big companies' financial strength makes it possible for them to maintain large technical service groups, analytical chemists, and material safety data sheet programs more easily and, in general, more extensively than the independents can. Also, Chemcentral's Hough points out, size is an advantage, because by representing a supplier in several cities, the supplier can deal with a single party.

Celanese's Rogers agrees. "The nationals have very sophisticated business staffs from the financial, legal, and safety points of view," he says. "They also have broader geographic coverage because some of their customers have multiplant locations that they serve. This doesn't mean independents aren't as careful and ethical."

Rogers also agrees that many producers find the idea of having a good chunk of their national distribution done by one company appealing. If a chemical company were distributing small shipments around the country, he says, it would be a lot easier to control the marketing if the company were dealing with just one distributor.

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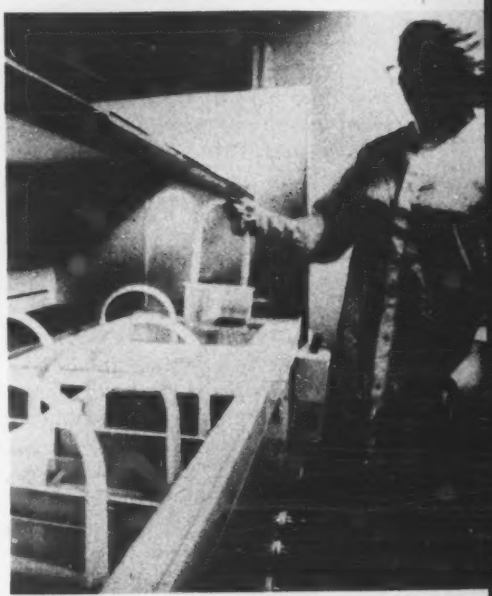
a distribution problem can work only in some cases. For the commodity-type product that must reach every corner of the U.S., says Du Pont's Cluett, the way to do it is through a national, because it has branches in many parts of the country.

Cluett points out, however, that both multilocation distributors and independents have their particular strengths. "Our distributor network is made up of both kinds," he says. "We don't look at them so much in terms of what strength they bring in general. We look at them in terms of what strength they bring to a particular marketing effort we're trying to pursue. We have some specialty type products that go to very limited markets that don't belong with the nationals. We have some independents that handle those products just beautifully."

Although small size does not necessarily hamper an independent's operational competitiveness, lack of financial resources can hurt it. As product liability suits become ever more prevalent, chemical producers want to be sure that their distributors are adequately insured. A producer wavering between an independent and a national might give its business to the national, all other things being equal.

The need for extensive product liability protection and regulation-driven capital outlays also could keep many of the very small distributors out of two adjunct businesses that are becoming extremely lucrative—waste disposal and solvent recycling. Although solvent recycling already existed, it was the passing of the Resource Conservation & Recovery Act of 1976 (modified in 1980) that has given both businesses a push.

Among distributors, McKesson is a leader in recycling with its two-year-old McKesson Envirosystems operation—part of the company's chemical group, which had $603 million in sales last year. Ashland, also in recycling, has been collecting toxic wastes from customers considered "small generators" for the past two years. When the company accumulates a truckload of waste, it transports it to Chemical Waste Management for disposal. By 1990, says



Silicon chip wafers are bathed in McKesson-supplied hydrofluoric acid

Ashland's Parsons, waste disposal could account for as much as 10% of the company's business.

None of this means that the nationals are going to dominate chemical distribution. Their aggregate share of the market is still small, and some analysts believe it will not get significantly larger.

"The independents aren't going to disappear off the face of Earth by any means," says A. T. Kearney consultant Gunn. "They're there. I don't think the nationals are going to be able to gain share at the expense of the independents. I do think that the nationals will continue to pick up share that is marginally producer business now. There may be some erosion at certain localities where the national companies will pick up some share from the locals. And there also will be continued acquisitions."

Gunn points out that many small distribution firms were founded after World War II. Their founders, now nearing retirement age, can liquidate their investment by either passing the company on to employees or family members or selling out. Gunn sees "selective" sales of independent companies to both national and large regional distributors.

Continued acquisition of smaller companies would seem to indicate

growing concentration of market share among fewer firms, but so far, at least, the number of companies disappearing by absorption has been more than matched by the creation of new firms.

PPG's Buerkle says: "My experience is that every time a national distributor acquires an independent, it seems like someone from the management group will go out and start another independent. I don't see any thinning out of the ranks. Things like product liability make mom and pop distributors almost impossible, but as old distributors disappear, either because of bankruptcy or by being purchased, another distributor will blossom in its place."

But consultant Gunn is not so sure. Between regulations and local zoning boards, he points out, it is difficult for a new company to get permits. It is also difficult to build a customer base now, he says. "Customers don't want to deal with more distributors," he says. "There are plenty of distributors out there right now. They've got to have a good reason for going to a new [one]."

To attract new customers, distributors both new and old are increasingly realigning their product lines to establish themselves in niches. Chemcentral, for example, despite its size, specializes in markets like protective coatings, printing inks, adhesives, chemical specialties, and rubber and plastic products. "Some people use a shotgun approach," says chief executive Hough. "We try to use a rifle approach."

Hough points out that not all distributors must choose a product niche. Some firms, he says, will get on very well with a shotgun approach. "It may be that some organizations will have both specialty salesmen and general line salesmen," he explains.

But Buerkle believes most distributors will have to specialize in the future. "The survivors are all going to end up, by hook or by crook, getting into one of these niches," he argues.

No one thinks chemical distributors will be able to prosper by standing still. In other words, the 1980s will bring them big growth but also major reshuffling. "[Distributors are] going to have to be in state-of-the-art distribution management techniques if [they're] going to survive later in this decade," says Great Lakes Terminal & Transport's Kendell. "We feel that closer touch to the customer is going to be very important, increased service is going to be very important, and probably most important will be the need to add to the product line those products or services that are value-added and that the distributor invests in rather than the manufacturer. That's going to be a tough bullet to bite for many distributors, because they do not have the kind of reserves necessary to support that kind of effort." □

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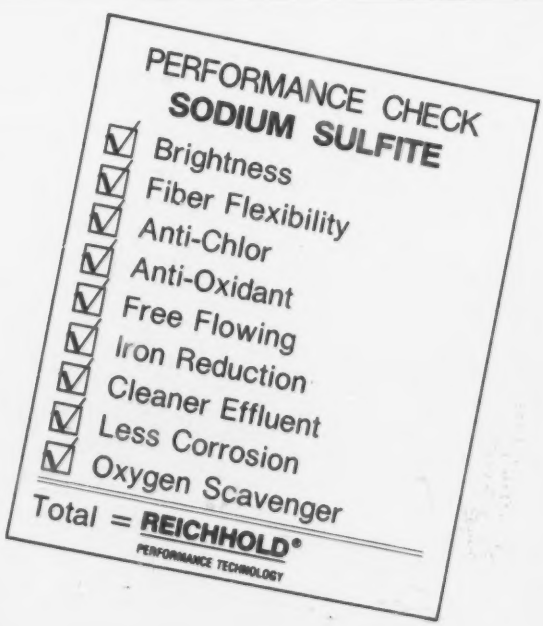

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